

Maths 165

Review Sheet - Final

1. Find the sum

$$\sum_{i=1}^5 i^2.$$

2. In approximating the area under the graph of $f(x) = e^{-x}$ from $x = -2$ to $x = 1$ using n equally spaced rectangles with x_i^* being the right endpoint, does your approximation overestimate or underestimate the actual area. Justify your answer.
3. Set up the sum to use the Midpoint Rule with $n = 4$ to approximate $\int_1^3 x^2 dx$.
4. Express the following as a single integral:

$$\int_1^3 f(x)dx + \int_5^7 f(x)dx \\ - \int_5^3 f(x)dx + 3 \int_1^7 g(x)dx.$$

5. Evaluate $\int_0^4 \sqrt{16 - x^2} dx$ by interpreting the integral as area and using geometry.
6. If $F(x) = \int_0^{\sqrt[3]{x}} \sqrt{1 + t^4} dt$, what is $F'(x)$?
7. If $F(x) = \int_0^x 2t - 3t^2 dt$, what is the maximum value of F on the interval $[0, 1]$?
8. Find the area under the graph $y = x^2 - 2x + 3$ from $x = 0$ to $x = 3$.
9. Find the area under the graph of $y = \frac{2}{1+x^2}$ from $x = 0$ to $x = \sqrt{3}$.
10. Compute $\int \sin x + \frac{1}{x} + \frac{1}{x^2} dx$.
11. Evaluate $\int_1^4 \frac{x^2 - x + 1}{\sqrt{x}} dx$.

12. Evaluate $\int_{\ln 3}^{\ln 6} 8e^x dx$.

13. Evaluate $\int_7^3 x(x^2 + 1)^{1/2} dx$.

14. Evaluate $\int x \cos(x^2 + 1) dx$.

15. Evaluate $\int_7^3 -(\cos x)e^{\sin x} dx$.